DOCUMENT RESUME

ED 190 262 PS 011 651

AUTHOR Seibert, Jeffrey M.
TITLE The Development of Pre-Linguistic Communication Skills: A Neo-Piagetian Analysis Based on Levels of Cognitive Organization.
SPONS AGENCY Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.: Mailman Center for Child Development, Miami, Fla.
PUB DATE Feb 80
GRANT G007802091
NOTE 24p.: Paper presented at the Annual Interdisciplinary UAP-USC Conference on Piagetian Theory and the Helping Professions (10th, Los Angeles, CA, February 1-2, 1980).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Age Differences: Cognitive Development: *Communication Skills: Developmental Stages: *Disabilities: *Infants: *Interpersonal Competence: *Language Acquisition: *Measures (Individuals): Models: Nonverbal Communication
IDENTIFIERS Neo Piagetian Theory: *Prelinguistics

ABSTRACT

This paper describes an assessment instrument being developed to trace the emergence of social-communication skills leading to language and the neo-Piagetian model that is directing the assessment construction efforts. The model is a structural stage model, based on the writings and research of Uzgiris (1976), McCall, Eichorn & Hogarty (1977), and Fischer (1977). The model analyzes social-communication into distinct developmental dimensions focused on different social-communicative problems confronting the infant, each of which forms the basis for an individual scale of the assessment instrument. This set of social-communication scales and a set of object scales (adapted from Uzgiris & Hunt, 1975) have been organized according to developmental levels that the model asserts should reflect common underlying structural organization across both domains. Results of research with a group of handicapped infants and toddlers, which examined the pattern of relationships among scores on these two sets of scales with chronological age and Bayley physical age, support the claim of the model that a specific cognitive structural base underlies developments in the social-communication and object domains, as operationalized by the assessment instruments. (Author/MP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED190262

The Development of Pre-Linguistic Communication Skills: A Neo-Piagetian Analysis Based on Levels of Cognitive Organization[1]

Jeffrey M. Seibert

Mailman Center for Child Development

University of Miami

Presented at the
Tenth Annual Interdisciplinary
Conference on Piagetian Theory
and the Helping Professions
Los Angeles, February 1980

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Jeffrey M. Seibert
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

PS011651

[1]Research reported in this paper is part of a research project supported by BEH Grant #G007802091 and Mailman Foundation.

Running head: Pre-linguistic Communication

Abstract

Employing a neo-Piagetian model of cognitive development proposed by Fischer (1977), an assessment instrument is being developed to trace the emergence of social-communication skills leading to language. The model is a structural stage model, based on the writings and research of Uzgiris (1976), McCall, Eichorn & Hogarty (1977), and Fischer (1977). The model analyzes social-communication into distinct developmental dimensions focused on different social-communicative problems confronting the infant, each of which forms the basis for an individual scale of the assessment instrument. This set of social-communication scales and a set of object scales (adapted from Uzgiris & Hunt, 1975) have been organized according to developmental levels that the model asserts should reflect common underlying structural organization across both domains. Results of research with a group of handicapped infants and toddlers, examining the pattern of relationships among scores on these two sets of scales with chronological age and Bayley physical age, support the claim of the model that a specific cognitive structural base underlies developments in the social-communication and object domains, as operationalized by the assessment instruments.

The Development of Pre-linguistic Communication Skills: A Neo-Piagetian Analysis Based on Levels of Cognitive Organization

This paper describes an assessment instrument being developed to trace the emergence of early communication and social interaction skills leading to language and the neo-Piagetian model that is directing the assessment construction efforts. Results of research to validate both the assessment instrument and the theoretical model from which it is derived are also reported.

The theoretical model is based on a neo-Piagetian model of cognition put forth by Fischer (1977), which proposes to integrate learning theory with the Piagetian structural theory of development. Within this framework, cognition is conceived of most generally to include problem-solving and knowledge in the social as well as the inanimate object domain, which is not inconsistent with Piaget's own position (Piaget, 1951, 1952, 1954). Differences between Fischer and Piaget lie primarily in the explicit role Fischer attributes to specific experience in determining whether particular skills and concepts will be evident in a child's behavioral repertoire. Further understanding of the theoretical model should emerge from a consideration of how it is directing construction of the assessment scales.

In establishing the somewhat arbitrary boundaries for the individual scales of the communication assessment, it is necessary first

to define the larger universe from which these processes are derived. With Cognition representing the universe to be divided, the first level of analysis proposes a distinction between an Object domain (problem-solving focused on objects) and a Social-Communication domain (problem-solving focused on people). Within each of these domains, component conceptual processes, or developmental dimensions (Wohlwill, 1973) can be identified which each form the conceptual base for an individual scale. For the remainder of the paper, the word "domain" will be used to refer to the two major subsets of cognitive behaviors focused either on objects or on persons; "developmental dimension" will refer to the component conceptual processes identified within each of the major domains.

In determining developmental dimensions for scale construction, (the second level of analysis of the model), Piaget's (1951, 1952, 1954) description of the emerging sensorimotor concepts has been used to delineate the component processes of the Object domain. The Infant Psychological Development Scales, developed by Uzgiris and Hunt (1975), represent an already developed, available instrument that, with minor modifications (e.g., exclusion of items, such as imitation, with a strong social focus), can be used to assess the child's development in the Object domain. At this same level of analysis for the Social-Communication domain, we have identified dimensions that reflect aspects of the social-communicative problems confronting the pre-linguistic child, from the

perspective of the concepts and skills of the non-symbolic communication system that the normal young child of eighteen to twenty-four months of age has mastered. In other words, these developmental dimensions are conceptualized to trace the development of social-communicative knowledge and problem-solving to the highest level of sensorimotor-social intelligence, prior to the emergence of language. Their development parallels the emergence of the Piagetian concepts about objects that also reach full development by the end of the sensorimotor period. These developmental dimensions have been abstracted from a comprehensive review of the burgeoning literature on maternal-infant interaction and the development of pre-linguistic communication (see, for example, Bates, 1976; Bates, Camaioni & Volterra, 1975; Bates, Benigni, Bretherton, Camaioni & Volterra, 1977; Bates, Bretherton, Shore & Carpen, 1979; Benedict, 1979; Bruner, 1975a; Bruner, 1975b; Bruner, 1977; Bullowa, 1979; Collis, 1977; Corrigan, 1977; Dore, 1975; Dore, Franklin, Miller & Ramer, 1976; Dunst, 1978; Escalona, 1973; Halliday, 1975; Huttenlocher, 1973; Lewis & Rosenblum, 1977; McCall, Eichorn & Hogarty, 1977; McLean & Snyder-McLean, 1978; Nelson, 1973; Nelson, 1974; Ninio & Bruner, 1978; Reich, 1976; Scaife & Bruner, 1975; Schaffer, 1977; Snyder, 1978).

The developmental dimensions can be generally characterized as dealing with three classes of social-communicative problems: Gaining Attention to Oneself, Directing Attention to an Object, or Regulating Another's Behavior to Achieve a Desired Goal. However, because these

dimensions tap interactions with another social being, with the possibility therefore of reciprocal interactive relationships, an individual may be in either the role of the initiator or the role of responder. These dual roles involve related but nevertheless different sets of skills. This reciprocal potential is reflected in the breakdown of each social-communicative problem into the complementary dimensions of Initiating and Responding, with an additional dimension, Maintaining, included within Gaining Attention to Oneself, because it appears to develop out of an integration of both Initiating and Responding and reflects a developmental skill that may be important in its own right. A schema for the breakdown of the two domains into developmental dimensions, each of which provides the conceptual basis for an individual scale, is presented in Figure 1.

Insert Figure 1 about here

Each scale in both domains has been further organized, within the framework of the neo-Piagetian model, to include behavioral items that are representative of each of five developmental levels or stages. Recent research and theory (Uzgiris, 1973, 1976; McCall, Eichorn, & Hogarty, 1977; Fischer, 1977) suggest five levels can be used to characterize the qualitative changes that occur in the organization of cognitive behaviors during the first two years of life. A discussion of the evidence in support of this five-stage model is, however, beyond the scope of this paper.

Any real stage model (Wohlwill, 1973) such as this one is necessarily a structural model which posits general organizing principles that can be used to analyze and establish similarities across broad domains of superficially different behaviors, such as the object and social-communication domains. Practically, a structural model of development argues that knowledge of a child's skill level in one domain yields probabilistic information about his level of functioning in the structurally-related domain where no direct knowledge may exist. The specific kind of stage model that appears to be emerging, based on available data, is one in which neither the object domain nor the social-communication domain is more basic than the other. Congruence in development between domains is attributable to development along common structural lines. Structure, in other words, is a basic aspect of organization that can manifest itself through development in either domain. Decalage or discrepancy across domains is observed due to variability in the nature of the individual's motivation and opportunity for experience. Development in neither domain is prerequisite to development in the other domain, except where a skill in one domain is a component of a skill in the other domain.

A brief characterization of the structural levels, based on a synthesis of the research just noted, follows:

Level 0, spanning approximately the first one to two months, in light of recent evidence for the perceptual sophistication of the

neonate and tentative evidence for cortical control of visual processing, manifested in visual recognition memory (Fagan, personal communication), is appropriately characterized as a stage of responsive, in contrast to initiating, interactions with the environment.

Level 1, spanning approximately two to seven months, has been characterized as the level of simple, voluntary action. Intention becomes evident in the infant's behavior through repetition of simple acts that produce consequences of interest to the infant. There is, however, no differentiation of means from ends, since goal-directed behavior can be frustrated by any obstacle which, to be circumvented, requires subordination of a second action (removing the obstacle) to the goal-directed act.

At Level 2, approximately 8 to 13 months, this coordination of action sequences in service of a goal becomes possible as means become differentiated from ends and the child's actions begin to reflect a perception of physical differences among the objects and persons in his environment. However, the means-ends relationships employed to reach a goal operate as undifferentiated wholes and the child appears to act with no real understanding of the relationships involved.

At Level 3, spanning 13 to 18 months, the child's problem-solving demonstrates an understanding of the means-ends relationship he employs, as he becomes capable of discriminating when a particular means is appropriate to a goal and of modifying his actions when feedback

indicates that his efforts are unsuccessful. At this level object and social skills are integrated and the highest level of non-representational problem-solving is observed.

At Level 4, covering 18 months and on, the child moves to a representational model of problem-solving, beyond the sensorimotor level. The child begins to anticipate which means are most appropriate in relatively novel problem-solving situations, and incorporates behaviors that rely on symbolic skills into his problem-solving endeavors.

Table 1 provides an example of how a scale from each of the domains has been constructed according to these structural principles, although details of the process are beyond the scope of this paper.

Insert Table 1 about here

Research to Validate the Structural Model

A major obstacle to a test of the hypothesis of a common structural base underlying developments in both the object and social-communication domains is that, in the population at large, although measures of development in the two domains may be highly correlated with each other, they are also correlated with less theoretically interesting measures. The fact that these measures correlate highly with chronological age and level of motor development, or physical age, may indicate that any observed relationship between object and social measures is indicative

of something general, such as opportunity for experience or a general maturational function, rather than a cognitive structure specific only to object and social problem-solving skills. On the other hand, a heterogeneous sample of handicapped infants and toddlers may provide a natural test of the model's hypothesis, since these measures, typically highly correlated in a normal sample, may no longer all be highly correlated with each other in the handicapped sample. Where correlations between measures are reduced substantially, it can be concluded that the nature of the relationship between measures observed in normal development is not a necessary one. Where strong relationships maintain between measures, despite the heterogeneity of the sample, the case for a specific common structural relationship underlying both domains is strengthened.

Such a sample of handicapped infants and toddlers was accessible to the research project through their participation in a program of early intervention and provided the subjects for the research to be reported. Criteria for inclusion in the study were that the child have enough functional vision and motor ability to demonstrate reach and grasp and that Bayley Scale scores place him more than two standard deviations below the norm in either mental or motor performance. The data to be reported are from 32 children, ranging in age from 9 months to 42 months, with a mean age of 28.3 months and a standard deviation of 9.1 months, and ranging in mental age from 4 months to 27 months, with

a mean age of 13.4 months and a standard deviation of 6.0 months. A variety of handicapping conditions are represented in this sample, ranging in severity from mild to severe, with disabilities including Down's Syndrome, hydrocephaly, microcephaly, cerebral palsy, hearing impairment, visual impairment, and emotional disturbance.

The data from each child consisted of a mean social-communication level score (mean computed by averaging the level scores from all of the social-communication scales, using the highest level item the child passed in each scale as his score for that scale), a mean object level score (mean computed in a similar fashion), Bayley physical age, and corrected chronological age. The results of the series of pair-wise correlations on the data are presented in Table 2.

Insert Table 2 about here

Chronological age, as anticipated with this sample, is only modestly correlated with the object measures and not significantly correlated with communication level. What is more important to the prediction of the model is the low correlation of physical age with communication level, coupled with the very strong relationship between object scores and social-communication scores. A hierarchical type multiple regression correlation analysis (Cohen & Cohen, 1975) was performed on the data to determine the strength of the relationship between the object and communication scores, with the variance shared with both chronological

age and physical age removed from the object scores. The object scores, despite this conservative analysis, continue to account for over 69% of the variance in the communication scores. The fact that communication relates strongly to object cognition level but not to physical age provides strong support for the model's assertion that developments in the object and communication domains are related in a structural way that is distinct from a more general maturational function, reflected in motor development.

An additional question that can be answered with the data is whether the developments in one domain consistently lead developments in the other or, as the model predicts, whether the relationship is variable from individual to individual, as a function of differential opportunities for experience in each domain, with some children showing communication skills more advanced than their object skills, and others displaying the opposite pattern. To answer this question, the difference in each child's mean communication level score relative to his mean object level score was computed. Perfect level correspondence between the two domains for all children, as just noted, is <u>not</u> a prediction of the model; the model predicts that the difference scores between mean levels in the social communication and object domains should approach a symmetric distribution around the zero difference point, with an obvious mode around zero, if in fact the levels in each domain are structurally equivalent and neither domain necessarily leads development

in the other domain. The results of the test of this prediction are presented in Figure 2. The distribution of differences is as predicted. The modal cluster of differences around zero and the roughly equal distribution of scores on both sides of the zero point (8 vs. 9) argue very strongly that items in the two domains have been equated for structural level.

Insert Figure 2 about here

Although the evidence conforms to predictions of the model, further research needs to be done, both to validate the assessment instrument and to provide further support for the structural level analysis. The ordinality of the individual scales remains to be established through longitudinal studies of both handicapped and non-handicapped children and through cross-sectional studies with normal children. Research also needs to be directed at the determination of interrelationships among skills across different scales both within and between domains. A skill or concept in one scale may be a prerequisite to the development of a skill in another scale; the abstraction of developmental dimensions into separate scales should not be interpreted to mean that development within each scale is unrelated to developments within other scales. Training studies should provide additional evidence on which are the necessary functional relationships among skills, as well as provide further support for the existence of common structural levels.

The assessment instrument, besides being a theoretical research tool, should have important intervention implications if it, and the theoretical model upon which it is predicated, can be validated. For example, the assessment scales readily lend themselves to a developmental profile format. The developmental profile can summarize and integrate a considerable amount of information about a child's adaptive functioning across broad behavioral domains, and provide the interventionist with a picture of the child's relative strengths and weaknesses across the different developmental dimensions of both domains. The ordinal developmental dimensions should, in addition, provide useful information on training sequences. The concept of structural levels should contain the seeds of ideas for global, qualitatively different intervention styles that are each appropriate to each of the structural levels.

All of this remains for the speculative but suggestive. We are a number of steps away from validation of such a model. The model's primary objective is to provide a framework for asking what the very young child understands about adapting to his physical and social environment and what he must master next to become a more effective problem solver in his interactions with that environment.

REFERENCES

Bates, E. Language and context: The acquisition of pragmatics. New York: Academic Press, 1976.

Bates, E., Camaioni, L., & Volterra, V. The acquisition of performatives prior to speech. Merrill-Palmer Quarterly, 1975, 21, 205-226.

Bates, E., Benigni, L., Bretherton, I., Camaioni, L., & Volterra, V. Cognition and communication from 9-13 months: A correlational study. Program on Cognitive and Perceptual Factors in Human Development, Report No. 12, 1977.

Bates, E., Bretherton, I., Shore, C., & Carpen, K. The emergence of symbols in language and action: The role of contextual support. Paper presented at the meeting of the Society for Research in Child Development, San Francisco, March 1979.

Benedict, H. Early lexical development: Comprehension and production. Journal of Child Language, 1979, 6, 183-200.

Bruner, J.S. From communication to language - A psychological perspective. Cognition, 1975a, 3, 255-287.

Bruner, J.S. The ontogenesis of speech acts. Journal of Child Language, 1975b, 2, 1-19.

Bruner, J.S. Early social interaction and language acquisition. In H.R. Schaffer (Ed.), Studies in mother-infant interaction. London: Academic Press, 1977.

Bullowa, M. Before speech: The beginning of interpersonal communication. Cambridge: Cambridge University Press, 1979.

Cohen, J., & Cohen, P. Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1975.

Collis, G.M. Visual co-orientation and maternal speech. In H.R. Schaffer (Ed.), Studies in mother-infant interaction. New York: Academic Press, 1977.

Corriga. R. Synchrony between task domains: Object permanence and language. Paper presented at the meeting of the American Psychological Association, San Francisco, August 1977.

Dore, J. Holophrases, speech acts and language universals. Journal of Child Language, 1975, 2, 21-40.

Dore, J., Franklin, M.B., Miller, R.T., & Ramer, A.L.H. Transitional phenomena in early language acquisition. Journal of Child Language, 1976, 3, 13-28.

Dunst, C.J. A cognitive-social approach for assessment of early nonverbal communicative behavior. Journal of Childhood Communication Disorders, 1978, 2, 110-123.

Escalona, S.K. Basic modes of social interaction: Their emergence and patterning during the first two years of life. Merrill-Palmer Quarterly, 1973, 19, 205-232.

Fischer, K.W. A theory of cognitive development: The control and

construction of a hierarchy of skills. Unpublished manuscript, University of Denver, 1977.

Halliday, M.A.K. Learning how to mean. In E.H. Lenneberg and E. Lenneberg (Eds.), Foundations of language development, vol. 1. New York: Academic Press, 1975.

Hutten1ocher, J. The origins of language comprehension. In R.L. Solso (Ed.), Theories in cognitive psychology. Hillsdale, NJ: Lawrence Earlbaum, 1973.

Lewis, M., & Rosenblum, L.H. Interaction, conversation, and the development of language. New York: Wiley, 1977.

McCall, R., Eichorn, D., & Hogarty, P. Transitions in early mental development. Monographs of the Society for Research in Child Development, 1977, 42(3), No. 171.

McLean, J.E., & Snyder-McLean, L.K. A transactional approach to early language training. Columbus, Ohio: Charles E. Merrill Publishing Co., 1978.

Nelson, K. Structure and strategy in learning to talk. Monographs of the Society for Research in Child Development, 1973, 38, No. 149.

Nelson, K. Concept, word, and sentence: Interrelations in acquisition and development. Psychological Review, 1974, 81, 267-285.

Ninio, A., & Bruner, J. The achievement and antecedents of labelling. Journal of Child Language, 1978, 5, 1-15.

Piaget, J. Play, dreams, and imitation in childhood. New York: Norton, 1951.

Piaget, J. The origins of intelligence in children. New York: International Universities Press, 1952.

Piaget, J. The construction of reality in the child. New York: Basic Books, 1954.

Reich, P.A. The early acquisition of word meaning. Journal of Child Language, 1976, 3, 117-123.

Scaife, M., & Bruner, J. The capacity for joint visual attention in the infant. Nature, 1975, 253(5489), 265-266.

Schaffer, H.R. Studies in mother-infant interaction. New York: Academic Press, 1977.

Snyder, L.S. Communicative and cognitive abilities and disabilities in the sensorimotor period. Merrill-Palmer Quarterly, 1978, 24, 161-180.

Uzgiris, I.C. Patterns of cognitive development in infancy. Merrill Palmer Quarterly, 1973, 19, 181-204.

Uzgiris, I.C. Organization of sensorimotor intelligence. In M. Lewis (Ed.), Origins of intelligence. New York: Plenum, 1976.

Uzgiris, I.C., & Hunt, J.McV. Assessment in infancy. Urbana, IL: University of Illinois Press, 1975.

Wohlwill, J.F. The study of behavioral development. New York: Academic Press, 1973.

Table 1: Examples of Scales from the Object Domain and the Social-Communication Domain, Organized According to the Five Structural Levels

	Object Domain: Schemes for Relating to Objects	Social-Communication Domain: Initiating Social Means to Achieve Desired Environmental Events (Obtaining Desired Object)
0 (1-2 mos.) Responsive Interaction	Holds or grasps object placed in hand	Cries or fusses with no apparent environmental cause
1 (2-7 mos.) Simple Voluntary Action	Uses only simple action patterns on all objects (e.g., mouthing, banging, waving)	Cries or fusses when object is moved out of reach
2 (8-13 mos.) Differentiated Action	Uses different actions for different objects (e.g., stretches elastic, rubs cotton)	Either looks to other or exhibits sustained reach to desired object out of reach
3 (13-18 mos.) Action Modified by Differentiated Feedback	Uses objects in socially influenced ways (e.g., combs hair, wears necklace)	a. Reaches or points to object out of reach and looks to other b. Directs single word request to other for object out of reach
4 (18 mos. +) Action Modified through Anticipatory Regulation	Uses objects in representational play (e.g., feeds doll, combs doll's hair)	Requests object out of view

Table 2

Correlations among Chronological Age,

Physical Age, and Mean Levels for

Social-Communication and Object Measures (N=32)

	CA	PA	Mean Comm.
PA	.67***		
Mean Comm.	.33^{ns}	.38*	
Mean Object	.52**	.67***	.88***

* $p < .05$
** $p < .01$
*** $p < .001$

Figure 1: Organization of the Object and Social-Communication Domains

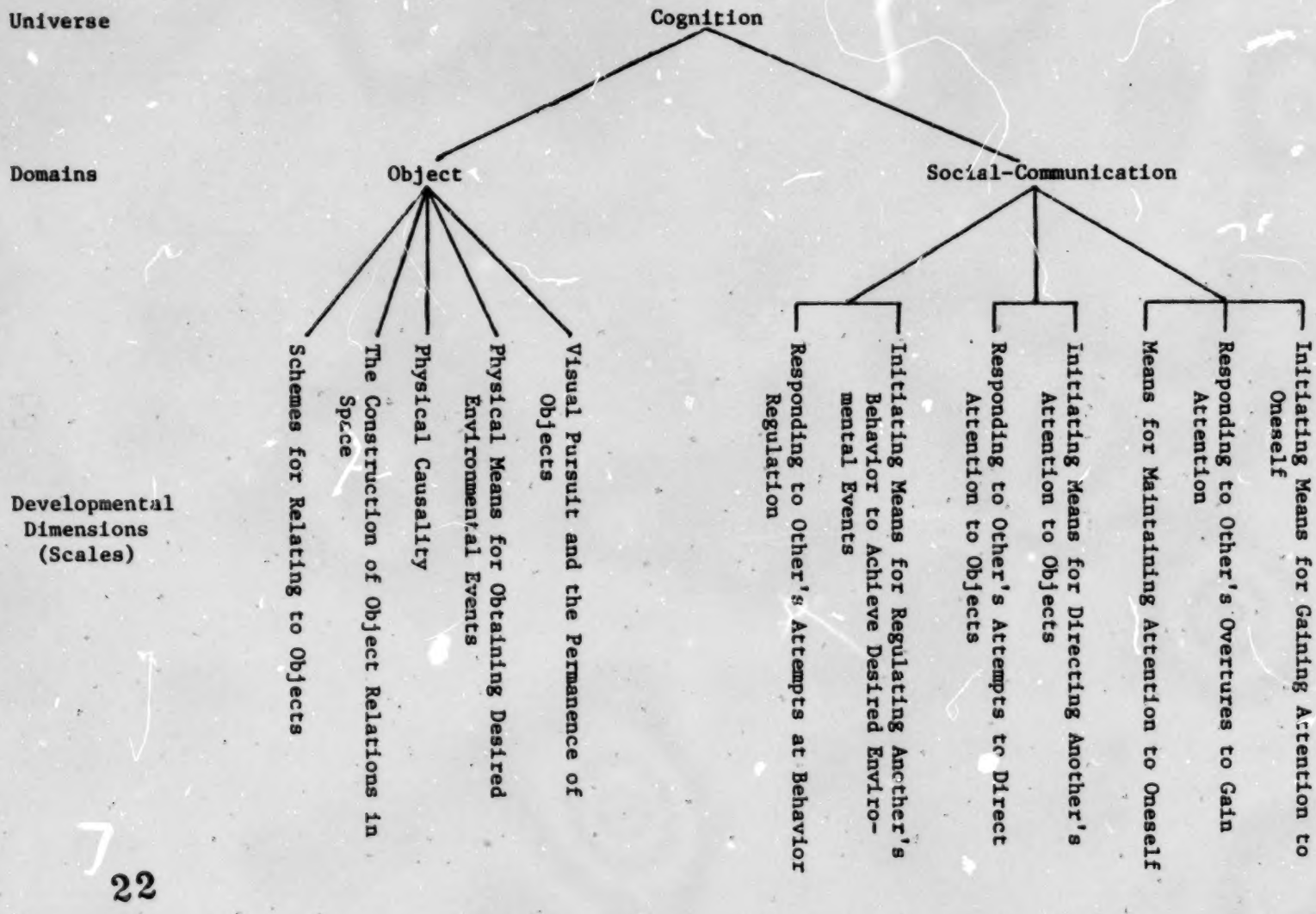
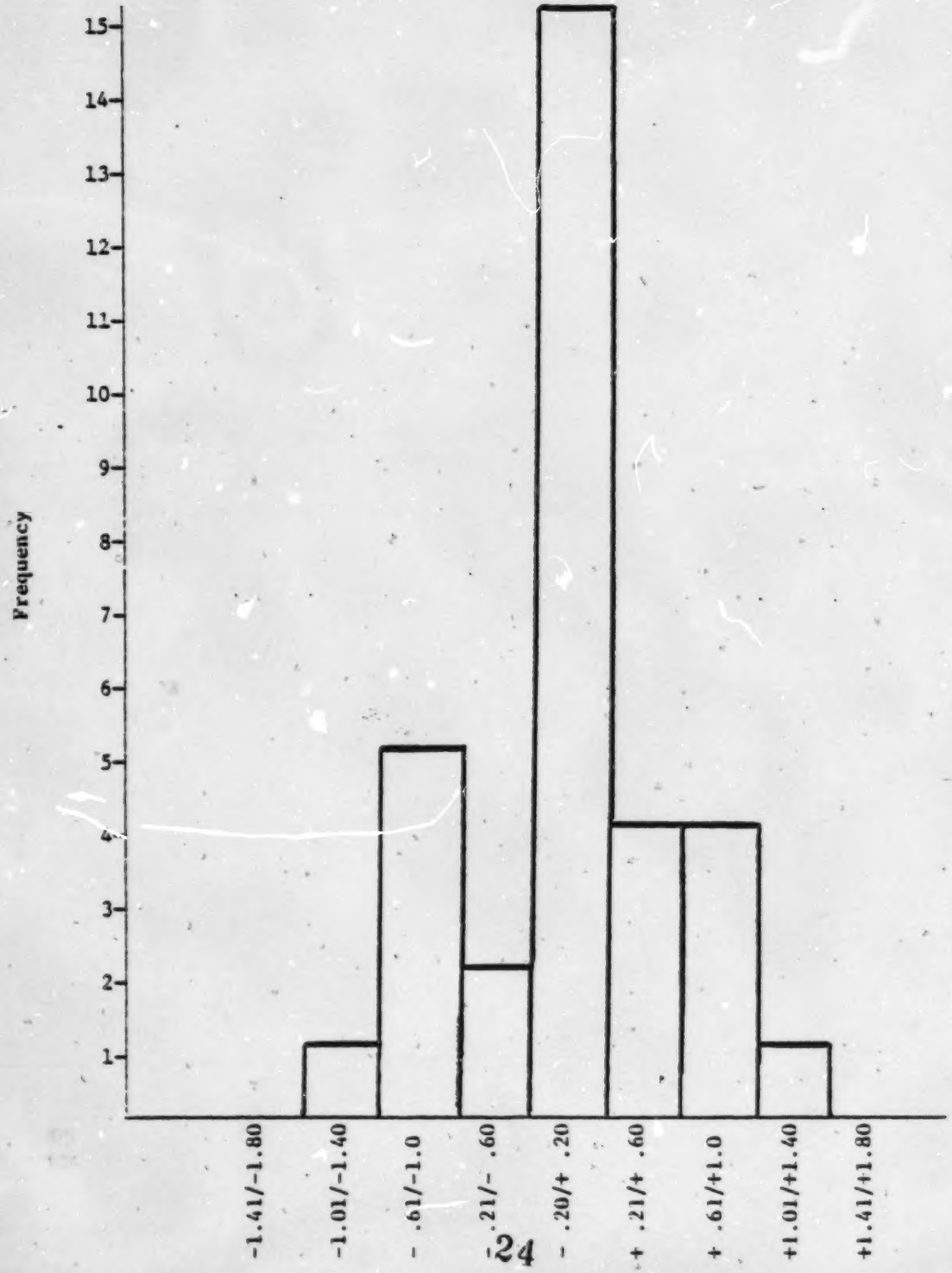

Universe
Cognition
Domains
Object
Social-Communication
Schemes for Relating to Objects
The Construction of Object Relations in Space
Physical Causality
Physical Means for Obtaining Desired Environmental Events
Visual Pursuit and the Permanence of Objects
Responding to Other's Attempts at Behavior Regulation
Initiating Means for Regulating Another's Behavior to Achieve Desired Environmental Events
Responding to Other's Attempts to Direct Attention to Objects
Initiating Means for Directing Another's Attention to Objects
Means for Maintaining Attention to Oneself
Responding to Other's Overtures to Gain Attention
Initiating Means for Gaining Attention to Oneself
Developmental Dimensions (Scales)

Figure 2: Frequencies of Discrepancies Between Mean Communication and Object Levels in .4 Stage Intervals (N=32)



Differences in Overall Mean Communication Level Relative to Overall Mean Object Cognition Level in .4 Stage Intervals